

first slit is for releasing stress, said first slit is substantially perpendicular to said rib.

26. (New) The tape carrier type semiconductor device according to claim 1, wherein said flexible substrate comprises a resin on a first side of said flexible substrate, said resin including a first heat expansion coefficient.

27. (New) The tape carrier type semiconductor device according to claim 26, wherein said flexible substrate comprises a solder resist on a second side of said flexible substrate, said solder resist including a second heat expansion coefficient. -

REMARKS

Applicant submits herewith an excess claim fee for six (6) additional dependent claims.

Claims 1-11 and 13-27 are all the claims presently pending in the application. Claim 12 is canceled without prejudice or disclaimer. New claims 19-27 have been added to more particularly define the invention. Claims 1-11 and 13-18 stand rejected on prior art grounds.

Claims 1-11 and 13-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the Admitted Prior Art in view of Kim, et al. (U.S. Patent No. 6,016,176).

This rejection is respectfully traversed in view of the following discussion.

It is noted that the amendments are made only to more particularly define the invention and not for distinguishing the invention over the prior art, for narrowing the scope of the claims, or for any reason related to a statutory requirement for patentability.

Attached hereto is a marked-up version of the changes made to the specification

and/or claims by the current Amendment. The attached page is captioned "**VERSION WITH MARKINGS TO SHOW CHANGES MADE.**"

It is further noted that, notwithstanding any claim amendments made herein, Applicant's intent is to encompass equivalents of all claim elements, even if amended herein or later during prosecution.

I. THE CLAIMED INVENTION

Applicant's invention, as disclosed and claimed, for example by claim 1, and similarly by independent claims 10 and 13, is directed to a tape carrier type semiconductor device.

The device includes a flexible substrate on whose surface wiring is formed, and a driver circuit which is mounted on the flexible substrate and drives a device connected to the flexible substrate. The flexible substrate includes a first slit having a connector situated intermediate for connecting both internal ends of the first slit to reduce warpage. The first slit comprises a first sub-slit and a second sub-slit. (See Page 6, lines 13-20; Page 8, lines 11-15; and Figure 1A).

Conventional tape carrier-type semiconductors have a stress-releasing slit which does not include two sub-slits and a bridge and, sometimes include, a reinforcement plate. However, neither configuration prevents warpage due to the different heat expansion coefficients caused by the resin on the one surface of the flexible substrate and the solder resist applied to the other side of the flexible substrate. Thus, the warpage may prevent the tape carrier device, a liquid crystal display and the print substrate from being "desirably" connected. (See Page 1, line 22-Page 2, line 20; and Figures 10A and 10B).

An aspect of the present invention includes a first slit which comprises a first sub-slit

and a second sub-slit. This configuration with a connector, i.e., a bridge, situated intermediate the two sub-slits, releases the stress caused by the two different heat expansion coefficients, e.g., for example, as defined in new dependent claims 26 and 27, exerted on the flexible substrate during manufacturing, and thus prevents the outer terminal from detaching from the print substrate and the liquid crystal panel. (See Page 1, line 27-Page 2, line 3; Page 2, lines 24-26; Page 3, lines 9-11; Page 6, lines 13-17; and Figures 1A and 1B).

With the present invention, a tape carrier type semiconductor device is easily manufactured and unlikely to warp. (See Page 3, lines 11-13).

II. THE PRIOR ART REJECTIONS

A. The § 103(a) Rejections of Claims 1-18

First, the references, separately, or in combination, fail to teach, disclose or provide a reason or motivation for being combined. In particular, the Admitted Prior Art ("APA") pertains to a tape carrier-type semiconductor device including a flexible substrate, folding slits and a stress-releasing slit. The APA also may include a reinforcement plate.

The APA is specifically directed to attempting to solve the problem of warpage of the flexible substrate during manufacturing caused by two different stresses applied to the side surfaces of the flexible substrate by providing a stress-releasing slit and, sometimes, a reinforcement plate. Accordingly, the APA teaches a tape carrier-type semiconductor device with a stress-releasing slit. (See Page 1, line 10-Page 2, line 20; and Figures 10A and 10B).

By contrast, Kim, et al. ("Kim") does not have the same aim as the APA.

Kim discloses an electronic apparatus, e.g., a portable notebook computer, with a flexible liquid crystal cell that is folded, which includes a liquid crystal display ("LCD") device with at least one flexible portion without a joint, a main body and a coupling member

for coupling the LCD device and the main body. (See Kim at Abstract; and Column 1, lines 35-40).

Kim is specifically directed to solving the problem of “demand to reduce the overall volume of the portable device” while making the “display portion large.” Kim provides for “a flexible liquid crystal display (LCD) device which is flexible without a joint thereby reducing the size of the electronic apparatus “while providing an enlarged display screen size without deteriorating display quality.” (See Column 1, lines 15-45).

Nothing within Kim has anything to do with a tape carrier-type semiconductor device including a flexible substrate, folding slits, and a stress-releasing slit in an attempt to solve the problem of warpage of the flexible substrate during manufacturing as disclosed in the APA. Indeed, in the APA, the folding slits are a type of joint whereas Kim explicitly discloses a device without any joint by relying on the flexibility of the LCD device. (See Application, Page 1, lines 14-15). Thus, APA teaches away from being combined with another invention, such as, Kim.

Therefore, one of ordinary skill in the art would not have combined these references, absent hindsight. It is clear that the Examiner has simply read Applicant’s specification and conducted a keyword search to yield the Admitted Prior Art and Kim. Further, the Examiner provides no motivation or reason to combine other than to assert that it would have been obvious to one having ordinary skill in the art at the time to modify the Admitted Prior Art with Kim. Such an assertion does not take into account the distinct structural differences of the prior art as indicated above, and further discussed below. Thus, the Examiner’s assertion attempts to solve a potential problem which does not ever exist with the Admitted Prior Art, and this assertion is further proof of the Examiner’s use of impermissible hindsight

Second, even if combined, the references do not teach or suggest the features of

independent claims 1, 10 and 13, including a flexible substrate which includes a first slit having a connector situated intermediate for connecting both internal ends of the first slit to reduce warpage, let alone, where the first slit includes a first sub-slit and a second sub-slit with the connector therebetween. (See Page 1, line 27-Page 2, line 3; Page 2, lines 24-26; Page 3, lines 9-11; and Figures 1A and 1B).

The Examiner admits that the APA does not disclose, teach or suggest “the flexible substrate is changed in shape, thereby forming the rib that is substantially perpendicular to the plurality of the first slits.” (See Office Action at Page 3, Paragraph 4). However, Applicant traverses the remaining assertion in the Office Action found at Page 3 in Paragraphs 1-3.

The Admitted Prior Art discloses a stress-releasing slit without any intermediate connector, not a first slit having a connector situated intermediate for connecting both internal ends of the first slit to reduce warpage, let alone, where the first slit includes a first sub-slit and a second sub-slit with the connector therebetween as indicated in Applicant’s invention. (See Page 1, line 27-Page 2, line 3; Page 2, lines 24-26; Page 3, lines 9-11; and Figures 1A and 1B). APA teaches that the stress-releasing slit does not include two sub-slits and thus the stress-releasing slit is without any intermediate connector.

Further, in Applicant’s invention, the connector may be a bridge structure, e.g., for example as defined in new dependent claim 20, “connecting both sides of the stress-releasing slit [7] arranged at the center of the stress-releasing slit.” (See Page 6, lines 18-19). Consequently, the Admitted Prior Art’s conventional structure is unsuitable for achieving at least two objects of the invention, which is to release, effectively, the stress caused by the two different heat expansion coefficients exerted on the flexible substrate during manufacturing and prevent the outer terminal from detaching from the print substrate and the liquid crystal panel thus providing a “tape carrier type semiconductor device which can be easily

manufactured and is unlikely to warp.” (See Page 1, line 27-Page 2, line 3; Page 2, lines 24-26; Page 3, lines 9-13; Page 6, lines 13-17; and Figures 1A and 1B). The Admitted Prior Art does not teach, suggest or disclose a shield connector, including a flexible substrate which includes a first slit having a connector situated intermediate for connecting both internal ends of the first slit to reduce warpage, let alone, where the first slit includes a first sub-slit and a second sub-slit with the connector therebetween.

Third, Kim does not make up for the deficiencies of the Admitted Prior Art. That is, regarding claim 1, Kim does not disclose any first slit to reduce warpage, let alone, where the first slit includes a first sub-slit and a second sub-slit with the connector therebetween as with Applicant’s invention.

Further, as indicated, regarding claim 10, Kim discloses a flexible portion without any joints and a reinforcement plate oriented on the flexible portion, whereas Applicant’s invention discloses a “flexible substrate includes a slit for folding the flexible substrate,” i.e., a joint. In addition, the reinforcement plate is disposed on the “outer surface of the liquid crystal cell” to maintain a shape of the LCD whereas Applicant discloses a rib to reduce warpage of the tape carrier type semiconductor device. (See Kim, Column 3, lines 15-27; and Application, Page 8, lines 23-27). Further, the reinforcement plate is possibly perpendicular to the slit through which a connector is moved not for “folding the flexible substrate” as disclosed in Applicant’s invention. (See Column 2, line 65-Column 3, line 5; and Figures 2-4). Thus, Kim also does not disclose or teach, including wherein said flexible substrate includes a slit for folding said flexible substrate and a rib which is formed substantially perpendicular to the slit as recited in claim 10 of Applicant’s invention.

For at least the reasons outlined above, Applicant respectfully submits that neither the Admitted Prior Art nor Kim teach or suggest all of the features of the independent claims 1,

10 and 13 and dependent claims 2-9, 11 and 14-18.

Regarding dependent claims 2-9, 11 and 14-18, which depend respectively from claims 1, 10 and 13, these claims are patentable not only by virtue of their dependency from their respective independent claims, but also by the additional limitations they recite.

For the reasons stated above, the claimed invention, and the invention as cited in independent claims 1, 10 and 13, should be fully patentable over the cited references.

III. FORMAL MATTERS AND CONCLUSION

Applicant has submitted herewith a proposed drawing correction to Figures 10A and 10B to label them as "Prior Art."

In view of the foregoing, Applicant submits that claims 1-11 and 13-27, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

Serial No. 09/788,503
ASH.010

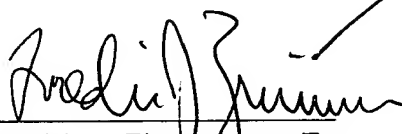
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The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date: _____

1/8/03

A handwritten signature in black ink, appearing to read "Fredric J. Zimmerman", is written over a horizontal line. A long, thin diagonal stroke extends from the top right of the signature towards the upper right corner of the page.

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the claims:

Claim 12 was canceled without prejudice or disclaimer.

The claims were amended as follows:

1. (Amended) A tape carrier type semiconductor device comprising:

a flexible substrate on whose surface wiring is formed; and

a driver circuit which is mounted on said flexible substrate and drives a device

connected to said flexible substrate, [and]

wherein said flexible substrate includes a first slit having a connector situated
intermediate thereto for connecting both sides of the first slit to reduce warpage[.], and

wherein said first slit comprises a first sub-slit and a second sub-slit with said
connector therebetween.

6. (Amended) The tape carrier type semiconductor device according to claim 5, wherein said flexible substrate includes a rib [which is] formed substantially perpendicular to the plurality of first slits.

8. (Amended) The tape carrier type semiconductor device according to claim 1, wherein said flexible substrate includes a rib [which is] formed substantially perpendicular to the first slit.

10. (Amended) A tape carrier type semiconductor device comprising:

a flexible substrate on whose surface wiring is formed; and

a driver circuit which is mounted on said flexible substrate and drives a device

connected to said flexible substrate,

wherein said flexible substrate includes a first slit for folding said flexible substrate and a rib [which is] formed substantially perpendicular to the first slit, and

wherein said first slit comprises a first sub-slit and a second sub-slit with a connector therebetween to reduce warpage.

13. (Amended) A flexible substrate, [which includes] comprising:

a first slit having a connector situated intermediate thereto for connecting both sides ends of the first slit to reduce warpage, and on whose surface wiring having a predetermined pattern is formed,

wherein said first slit comprises a first sub-slit and a second sub-slit with said connector therebetween.